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Zoran Popović
ENGAGE: A Game Based Learning and Problem Solving Framework (Task 1 Month 8)
Progress, Status and Management Report
Monthly Progress Report

Period Covered by the Report
October 1 through October 31, 2012

Date of Report: November 15, 2012

Project Title:
Contract Number: Grant FA8750-11-2-0102
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Technical Information

1. Technical Progress / Highlights - Observations

The pre- and post- tests for Refraction, Treefrog Treasure, and Creature Capture have been finalized by the Learning Science team and are now being integrated into the games. After the students get the link and they are filtered into the right condition, they will be given the pre-test before any gameplay occurs. The tests are "themed" for each game that they will appear in, so as to not feel as disjointed from the game and improve retention through the testing process.

In October, we focused on creating relationships with Seattle and Bellevue school districts, as well as reaching out to Lake Washington and Shoreline school districts. As these school districts are local to us, they could be extremely helpful in achieving rapid buy-in through close, face to face collaboration, as well as help us reach a potentially large number of students directly through the districts' math curriculum developers and math coaches. We are currently in discussions with the Seattle and Bellevue districts on potential use strategies for their schools.

The Learning Sciences team is planning on doing several in-classroom data collection sessions at University Child Development School (UCDS), Lowell Elementary School, Greenlake Elementary School and Interagency Academy (part of Seattle Public Schools) over the course of the next quarter. They will be employing a new data collection protocol created by Ryan Baker at Teachers College, Columbia. The tool is used to collect behavioral and affective data in the classroom during gameplay, and the recorded observations will be automatically synched to gameplay data. The behavioral measures include items such as: on-task, off-task, on-task conversation, on-task helping, on-task receiving help. Affective measures include items such as: engaged concentration, boredom, surprise, delight, eureka, frustration. Researchers will record both measures on each student in 20 second intervals.

We began the hiring process for the Community Manager position that was described in the last report. As the games are now in active use, we have been receiving a continuous stream of support requests and questions. The Community Manager will respond to incoming mail, communicate technical solutions to community members, and assist with outreach via social media and in-person playtest sessions.

2. Results or Problems and Solutions

We have been refining the games continuously as we get feedback from educators as well as analysis of gameplay data:

Refraction – Increased the number of splitters, benders, combiners, etc. in each level in order to limit the chance players will guess the answer and check by knowing they need to use all provided pieces. Removed mathematical symbols from splitters and combiners as we received feedback from math education experts that the use of mathematical symbols outside of their standard mathematical contexts tends to confuse kids more than help them.

Treefrog Treasure – Adjusted the math content progression to be faster (the time to fractions is now reduced) based on feedback from educators who played the game. Adjusted some of the levels to remove bottlenecks where players were stuck because of navigational, not math, difficulties.

Creature Capture – Preliminary data is informing the timing of the introduction of fractions in this game. A tutorial sequence that only uses integers, moving to fractions once the gameplay rules have been introduced, seems to result in longer play over a larger number of levels. We also saw in playtests that

students can become impatient during battle animations. We have made the battle animations skippable in certain cases.

3. Significant Accomplishments Anticipated During Next Reporting Period

We will have refined math progressions implemented in all of the games. Pre- and post-tests will be integrated into the games and data collection of test results will begin. In-classroom data collection with pre- and post-tests and gameplay data associated with behavioral and affective data will begin.

4. Publications relevant to this effort

"**Evaluating Competitive Game Balance with Restricted Play**" by Alexander Jaffe, Alex Miller, Erik Andersen, Yun-En Liu, Anna Karlin, and Zoran Popović. In *Artificial Intelligence and Interactive Digital Entertainment (AIIDE 2012),* (Palo Alto, CA), October 8-12, 2012.

"**RRT-Based Game Level Analysis, Visualization, and Visual Refinement**" by Aaron William Bauer and Zoran Popović. In *Artificial Intelligence and Interactive Digital Entertainment (AIIDE 2012*), (Palo Alto, CA), October 8-12, 2012.

5. Meetings and Events (Please include meetings with subcontractors)

October 1-2, 2012. *Digital Promise League of Innovative Schools*, Napa, California

October 8-12, 2012. Keynote, *Artificial Intelligence and Interactive Digital Entertainment (AIIDE 2012),* Stanford, Palo Alto, California

6. Changes to the Contract Organization

As mentioned in previous reports and other communication, we are developing a plan to replace the UTA subcontract with internal UW hiring and with external consultants from Stanford University. We are currently gathering all of the requested information regarding this change.